R·I·T Title: RCA Bench #2

Semiconductor & Microsystems

Fabrication Laboratory **Revision**: **C** **Rev Date: 02/06/2013**

Approved by:

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Process Engineer Equipment Engineer

1 SCOPE

The purpose of this document is to detail the use of the RCA Bench for wet cleaning of silicon wafers. All users are expected to have read and understood this document. It is not a substitute for in-person training on the system and is not sufficient to qualify a user on the system. Failure to follow guidelines in this document may result in loss of privileges.

2 REFERENCE DOCUMENTS

- Material Safety Data Sheets for Hydrofluoric Acid, Sulfuric Acid, Hydrochloric Acid, Ammonium Hydroxide and Hydrogen Peroxide.
- Safety Training.

3 DEFINITIONS

DI	-De-Ionized Water
HF	-Hydrofluoric Acid
HCl	-Hydrochloric Acid
NH_4OH	-Ammonium Hydroxide
H_2O_2	-Hydrogen Peroxide
H_2SO_4	-Sulfuric Acid

4 TOOLS AND MATERIALS

4.1 General Description

4.1.1 This RCA bench is set up with three quartz temperature controlled tanks for SC1, SC2 and Piranha, and a plastic tank for a 50:1 HF dip. There are two Quick Dump Rinse tanks. This bench is intended for general use RCA cleaning.

4.2 Wafer Boats

4.2.1 Only Teflon wafer boats and handles should be used for processing on this bench.

5 SAFETY PRECAUTIONS

5.1 Personal Safety Hazards

5.1.1 The RCA clean Station uses several hazardous chemicals including ammonium hydroxide (NH_4OH), hydrochloric acid (HCl), Sulfuric Acid (H_2SO_4), hydrogen peroxide (H_2O_2) and hydrofluoric acid (HF). Users should be aware of the unique hazards of the materials with which they are working, especially HF which is potentially lethal. If HF is spilled on a person, hospital treatment will be necessary. Immediately apply calcium gluconate or zepharin chloride (located on top of the solvent cabinet in Wet Etch II) to the affected area and inform SMFL staff member or lab instructor. If another chemical is spilled, remove clothing and rinse affected area in safety shower for 15 minutes and inform SMFL staff member or lab instructor.

5.1.2 When working at the RCA Clean station, always use appropriate personal protective equipment (PPE)—apron, face shield and heavy rubber gloves.

5.1.3 The PPE should not be worn any place other than the immediate vicinity of the RCA Clean Station. Do not walk away from bench while wearing PPE. If assistance is needed (i.e. to grab a Kim Wipe or timer, etc.), ask for assistance—do not get it while wearing PPE. Do not work at computer or answer the phone while wearing PPE. When finished at the RCA Clean station, rinse the PPE, fully dry it and return to hook.

5.1.4 It is imperative that all spills be immediately cleaned up because of the number and variety of materials used at this bench. Please see a staff member for assistance in cleaning up spills.

5.2 Hazards to the Tool

5.2.1 Never operate the heated tanks without the proper fluid level.

5.2.2 Operate the bench controls with clean gloves only. The chemicals used will cause damage.

5.2.3 Tanks are breakable, carefully place wafers in them and never bang a cassette on the side.

5.2.4 The RCA clean station is a “clean” area and only RCA cleans should be performed at the bench. All other wet processing should be done at another appropriate bench.

5.2.5 If a new HF bath is necessary, contact the process or equipment technician. Do not attempt to refill bath. There are several HF-based etchants and the correct one must be used for proper etching.

5.2.7 Do not dump hot chemicals. The temperature should be below 30C before dumping.

6 INSTRUCTIONS

6.1 Initial State Check

6.1.1 Verify that there are sufficient amounts of the chemicals that you will need in the chemical storage cabinet.

6.1.2 Make sure that the bench has power, DI water and that the nitrogen in Service Chase 2765 is on.

6.1.3 Make sure that you have reserved the bench with the Tool Reservation System and that you have swiped in your card on the card swipe system.

6.2 Resetting the System

6.2.1 The temperature controllers may be reset by cycling their power on and off.

6.3 Operating the system

6.3.1 RCA Clean Only

6.3.1.1 Turn on the main power to the bench with the **System Power** button on the top left of the bench.

6.3.1.2 Turn on the HF Bath with the Heaters On/Off button.

6.3.1.3 If the bench has been recently used, you may just recharge the chemical baths by adding 200mL of Hydrogen Peroxide to both of the quartz tanks.

6.3.1.4 If the chemicals are old, wait until the temperature is below 30C and drain the old chemicals with the aspirator. The aspirator control is on the top panel of the bench. Rinse out the tanks with the sprayer and then aspirate the rinse water. Remember to turn off aspirator when done.

6.3.1.5 Add **4500mL** of **DI** water to the **SC1** and **SC2** tanks. Fill a large beaker in one of the sinks or use the sprayer. Tanks are labeled near the back.

6.3.1.6 Turn on the **Microtemp** controllers on the upper panel for the tanks you will be using.

6.3.1.7 On the controllers, press **Hold** to remove the system from the hold state. This will start the tanks heating.

6.3.1.8 For the **SC1** bath, add **300mL** of **NH4OH** and then **900mL** of **H2O2**. *Do not carry beakers with chemicals across the room.*

6.3.1.9 For the **SC2** bath, add **300mL** of **HCl** and then **900mL** of **H2O2**. *Do not carry beakers with chemicals across the room.*

6.3.1.10 Wait for the **SC1** tank to heat up to 75C and the **SC2** tank to heat up to 75C.

6.3.1.11 The 50:1 HF tank usually does not need changing. If there is a problem with it, see a SMFL staff member. Only staff may dump HF.

6.3.1.12 The **Quick Dump Rinser** is operated on the top panel. Press **Start** to rinse.

6.3.1.13 **The clean proceeds as follows:**

SC1	10 minutes
Rinse	5 minutes
50:1 HF dip	1 minute
Rinse	5 minutes
SC2	10 minutes
Rinse	5 minutes
Rinser/Dryer	

Note: The HF dip may be moved to a different point in the clean or eliminated all together, depending on your process requirements.

6.3.1.14 To silence an alarm during the clean, press the **SIL** button on the Microtemp controller.

6.3.1.15 Do not adjust the level sensor tube. It should be bubbling slowly.

6.3.1.16 When finished with the clean, turn off the Microtemp controllers, the bench power on the upper left and the nitrogen in Chase 2765.

6.4 Errors during Run

6.4.1 If the controller does not turn on, make sure that the bench power is on.

6.4.2 If the controller alarms or does not heat, an interlock may be tripped. Verify that the liquid level is correct and that the level sensor is bubbling. Contact an SMFL staff member for assistance.

6.4.3 If a wafer falls out or breaks, do not attempt to retrieve it. Contact an SMFL staff member.

7 Appropriate Uses of the Tool

7.1 This tool is intended for general use RCA cleaning of silicon wafers.

7.2 Process tanks are labeled for their appropriate uses and should not be used for anything else.

7.3 Process temperatures are set and should not be changed without SMFL approval.

7.4 Only wafer cassettes are allowed, no single wafer carriers.

7.5 No wafers with metals or photoresist on them.

7.6 Piranha tank is reserved and should not be used without permission.

REVISION RECORD

Summary of Changes	Originator	Rev/Date
Original Issue	Sean O'Brien	A-05/03/2007
Modified 5.1.4, 6.3.1.4, added 5.2.7	Sean O'Brien	B-08/05/2008
Updated 6.3.1.4 for aspirator use instead of drains.	Sean O'Brien	C-02/06/2013